aa graphicx txfonts document Looking for Dust and Molecules in Nova V4743 Sagittarii Based on observations collected with the Swedish ESO Submm Telescope at the European Southern Observatory, La Silla, Chile Dust and Molecules in V4743 Sgr M. Nielbock L. Schmidtobreick M. Nielbock, mnielboc@eso.org European Southern Observatory, Casilla 19001, Santiago 19, Chile. Received xxx xxx, xxx; accepted xxx xxx, xxx We present 1.2 mm continuum images and spectral line observations of CO(1–0) and SiO(3–2) rotational transitions of the recent nova V4743 Sgr. The nova is detected at 1.2 mm showing a variable millimetre emission. Only upper limits of $T_{\rm A}^{\star} = 0.06$ K for CO and $T_{\rm A}^{\star} = 0.03$ K for SiO could be derived. We discuss the results in terms the nature of the millimetre emission favouring dust from a phase before the recent outburst as the likely radiating source. We also comment on the possibility of free–free emission from the ionised shell as the source of the measured millimetre radiation. ISM: dust — ISM: molecules – stars: novae – stars: individual: V4743 Sgr

Introduction V4743 Sgr was discovered as a possible nova by Katsumi Haseda (hase02) at about 5 mag on September 20th, 2002. West (west02) measured its position as R.A.(J2000) = $19^{\rm h}01^{\rm m}0938$, Dec.(J2000) = $-22°00'059$ with an uncertainty of 075. Kato et al. (kato+02) confirmed that the object is an Feii-class nova, and measured the FWHM of the Hα emission line of 2400 km s^{-1}. The light curves of AAVSO 2002 reveal it to be a very fast nova undergoing a steep decline from its maximum and reaching three magnitudes below maximum within 15 days. This is usually understood as the transition phase where dust formation might begin.

The formation of dust has been suggested in many novae because of a) the behaviour of their visual light curves which indicate the increase of interstellar extinction at the beginning of the transition phase, and b) the development of the infrared excess at the same time (see Bode & Evans bode+89 for an overview). The dust that forms during nova eruptions consists of a variety of mineralogies, and in some novae, simultaneous evidence is found for probably co-existing carbon–rich and oxygen–rich condensates (Evans et al. evan+97).

While most recent novae have been well observed in the optical and even infrared, hardly any observation exists at sub-millimetre or millimetre wavelengths. Still, these measurements are valuable, because they allow to investigate i) the expansion of the ionised shell from emission of free-free radiation as a progenitor of the colder neutral matter, ii) the formation of molecules like CO and other abundant species of the interstellar medium (ISM), iii) the subsequent formation of dust, which has a deep impact on our understanding of the enrichment of the ISM and hence the formation of stars.

The James Clerk Maxwell Telescope nova–monitoring group detected V4743 Sgr with SCUBA (Ivison ivis02). On October 3rd, about 12 days after visual maximum, they measured a flux density of 39 ± 4 mJy at 850 μm and determined an upper limit of 225 mJy at 450 μm.

In this paper, we present observations of the 1.2 mm continuum emission and the spectral line emission of CO(1–0) and SiO(3–2) of V4743 Sgr taken in a range between about 20 and 60 days after the visual maximum. We compare the 1.2 mm emission with Ivison's 450 and 850 μm data and discuss the implications for the origin of the millimetre emission.

Observations and data reduction The observations were carried out at the SEST on La Silla, Chile. Millimetre continuum observations at 1.2 mm were taken using the SEST Imaging Bolometer Array (SIMBA) operating at 250 GHz with a FWHM bandwidth of 90 GHz. The maps were produced with the fast-scanning mode (Reichertz et al. reic+01) without a wobbling secondary mirror. The correlated sky noise was eliminated during the data reduction process with MOPSIMOPSI has been developed by Dr. R. Zylka, IRAM, Grenoble, France The zenith opacity at 1.2 mm was determined with skydips, and ranged between $\tau_0 = 0.18$ and 0.44. Flux calibration was achieved with a series of Uranus maps. We estimate it to be accurate to 10%.

figure* -90!18cmek081.f1.eps maps The individual maps of V4743 Sgr at 1.2 mm continuum emission. The position of the nova as determined from optical observations is marked as a star. The beam size (lower left corner) is too large as that the structure of the source can be regarded as real.

M, Grenoble, France .